not known. We investigated the relationship between early lymphocyte recovery and transplant outcomes in 78 paients with MDS and AML evolving from MDS receiving T-cell-repleted transplantation from an haploidentical related donors. The median patient follow-up was 510 days (range, 15-3419 days). Higher relapse rate was observed in patients with an day 30 absolute lymphocyte count (ALC-30) $<$ 300 cells/μL compared to patients with an ALC-30 $\geq$ 300 cells/μL (35.5% *vs*. 13.8%, P=0.049). More patients had bacteria infections in those with an ALC-30 $<$ 300 cells/μL compared with patients with an ALC-30 $\geq$ 300 cells/μL (25.8% *vs*. 3.4%, P=0.015). In multivariate analysis, patients with a higher the ALC-30 (300 cells/μL) had improved overall survival (HR 0.099, 95% CI 0.029-0.337; P<0.0001), leukemia free survival (HR 0.271, 95% CI 0.122-0.602; P<0.0001), less relapse (HR 0.096 95% CI 0.011-0.827; P=0.033), and less transplant-related mortality (TRM, HR=0.073; 95% CI 0.016-0.324; P=0.001). A three human leukocyte antigen loci mismatch was associated with a higher incidence of TRM (HR 5.026 95% CI 1.392-18.173; P=0.014). Our results suggest that a higher ALC-30 ($\geq$ 300 cells/μL) could be a useful and simple tool to predict MDS and AML evolving from MDS patients with a superior outcome after unmanipulated HBMT.

Immune reconstitution studies following early alemtuzumab-based RIC HSCT

IR evaluated in 66 patients with data for $\geq$ 2 time points		3 months		6 months		12 months	
		MRD	MUD	MRD	MUD	MRD	MUD
ALC (cells/cumm)		1044	593[*]	1488	1011[@]	2338	1695
CD3 (cells/cumm)		478	195[-]	1250	1016	1306	1116
CD4 (cells/cumm)		169	69[#]	565	605	770	649
CD8 (cells/cumm)		278	123[#]	495	386	565	440
CD16+56 (cells/cumm)		183	166	180	181	216	102
CD19 (cells/cumm)		381	37[$]	498	50[$]	739	175[$]
IgA (mg/dL)		49	35	58	34	73	44[+]
IgM (mg/dL)		41	25	61	59	66	47
PHA (% normal)		18%	33.9%	42.9%	44.6%	80.5%	95.0%
Infections (total number in all 106 patients)	*Bacterial*	*132*		*69*		*45*	
	Viral	*106*		*51*		*37*	
	Fungal	*15*		*10*		*14*	
	Time	*3 months*		*3 months*		*6 months*	

Lymphocyte numbers, immunoglobulin levels and PHA proliferation are reported as median values. Infections are reported as total number of occurrences for all patients during that time period and include both localized and systemic episodes.

[@] P = .03.
[+] P = .02.
[-] P = .005.
[*] P = .001.
[#] P = .01.
[$] $P \leq$ .0001.

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Evolution and Clinical Implications of the T Cell Repertoire Following Cord Blood Transplant

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Cord blood transplant (CBT) recipients are at increased risk of transplant related mortality, in part due to delayed hematopoietic and immune system recovery resulting in increased infectious complications. However, without direct clinical measures of immunocompetence, the specific role of delayed immunity on CBT outcomes is not easily determined and intervention studies not possible.

Blood samples were collected (pre-transplant and at days 28, 56, 100, 180 and 365 post-transplant) in 34 consecutive patients undergoing myeloablative CBT for treatment of hematologic malignancies. All samples were subjected to Immunoseq, a novel T cell receptor (TCR) sequencing assay that delivers an unprecedented depth of sequencing data. From these data, clonal expansion and contraction of hundreds of thousands of clones were tracked over time and TCR diversity was directly measured. Basic clinical outcomes for all patients were also determined, including GvHD, overall survival, disease free survival, regimen related toxicities and infectious complications.

The ability to track clones demonstrated tremendous oscillation, with an almost entirely new T cell repertoire appearing at least monthly in CBT recipients. Furthermore, in contrast to healthy controls whose blood was sampled on a similar time-course, where the most frequent T cell clone at one time point remains the top clone at subsequent time points, the largest clones observed early post-transplant in CBT recipients subsequently dropped below detection within weeks of direct measurement. Of the 34 patients studied, six died of infectious complications between day 100 and one year. Notably, TCR diversity values for these six patients were far lower than those of the remaining patients (P-value = 0.015, see Figure 1).

The TCR repertoire is exceptionally dynamic following CBT, with many T cell clones rising to high frequency and then receding to an undetectably low level in a matter of weeks. By two months after transplant, TCR diversity accurately predicted risk of death due to infection in this patient cohort, suggesting that diversity of the TCR is a direct measure of immunocompetence and may be useful as a test

to guide clinical decision making in patients with acquired or congenital immunosuppression.

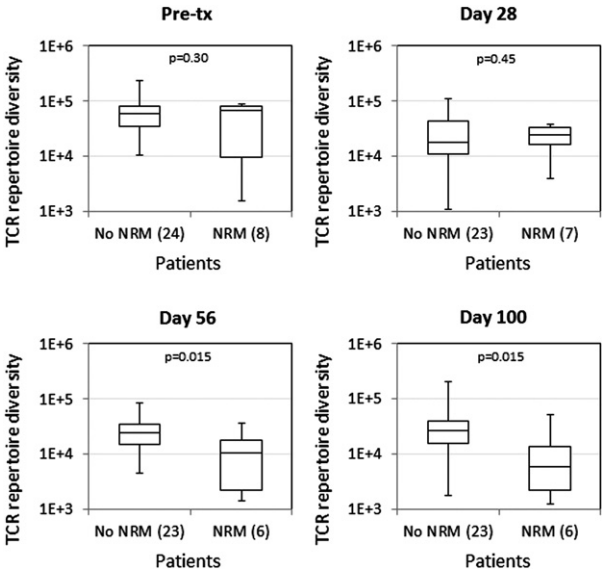

Figure 1. TCR Repertoire Size: NRM v. other patients
The figure shows a comparison of TCR repertoire size, estimated based on high-throughput sequencing of TCRβ rearrangements, for all surviving patients (N is indicated below each panel) with and without eventual non-relapse mortality (NRM). TCR repertoire size values are given as quartiles for both populations, with whiskers representing the maximum and minimum values. Significance is assessed using a one-tailed Mann-Whitney U test; patients who went on to suffer from non-relapse mortality had significantly lower estimated repertoire sizes at 56 and 100 days post-transplant.

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Impact of Atorvastatin On Cellular Immunome of Patients Undergoing Allogeneic Hematopoietic Stem Cell Transplantation (AHSCT)

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Introduction: Acute graft-versus-host-disease (aGVHD) is a frequent and lethal complication of HSCT despite current prophylaxis. Release of pro-inflammatory cytokines lead to damage of host tissues. Statins have been shown to reduce pro-inflammatory cytokines while increasing the migration of anti-inflammatory cytokines, especially when donor and recipient are exposed to it, thus reducing aGVHD. We present data on 14 patients enrolled in an ongoing phase II study evaluating the efficacy of atorvastatin as aGVHD prophylaxis in patients undergoing matched-related donor AHSCT.

Table 1
Effect of Statin on Immunomes

Statin vs. non-statin D30 (%)	*P*-value	Median(Range) Non-statin exposed	Median(Range) Statin exposed
Absolute Lymphocyte count	0.04688	850 (100-1300)	774.8 (109-2120)
DR+/14+ (absolute)	0.375	77.6 (43.1-86.3)	69.3 (19.2-92.1)
DR-/14+ (absolute)	0.1094	12.5 (2.7-34.4)	25.4 (1.8-78.6)
CD3+/56-/16-	0.04688	55 (15.4-78.2)	78.7 (52.5-95.8)
CD19+	1	1 (0.2-2.0)	0.7 (0-39.4)
CD69 +/CD3+	0.8655	3.2 (0.7-4.7)	2.7 (1.1-4.4)
CD3+/DR+	1	5 (1.4-30.1)	5.1 (0.4-13.7)
CD3+/DR -	0.1563	48 (17.5-77.1)	70.1 (52.9-85.1)
CD3-/56+/16+	0.03125	33.5 (16.5-42.2)	7.9 (2.7-21.0)
CD3-/56+/16+/314+	0.03125	18.1 (6.5-34.0)	4.6 (0.7-10)
CD3-/56+/16+/117-	0.03125	22.4 (11.8-36.4)	6.3 (0.9-12.9)

Method: In this phase II study donors receive atorvastatin 40 mg daily for at least 14 days before leukapheresis. Recipient patients receive Atorvastatin 40mg daily starting at least 7 days before initiation of transplant conditioning regimen in addition to standard approved GVHD prophylaxis with tacrolimus and methotrexate. Atorvastatin is continued until development of grade II or higher aGVHD, cessation of aGVHD prophylaxis and or adverse event. We compared the immune reconstitution pattern of patients on statin to those of historic control patients not on statin matched to age, sex, type of AHSCT and intensity of regimen.
Result: Median age of patients is 47 (range 27-67) and of donor 46.5 (29-64). Ten patients received reduced intensity AHSCT. Median neutrophil and platelets engraftment were 18.9 and 12.9 days. With a median follow up of 120 days (23-287), two patients have relapsed one of whom died due to disease. The median day 30 CD3 and CD34 chimerism were 81% and 100%. Two patients (14%) have developed grade II aGVHD with no patients developing grade III or IV aGVHD. Two patients developed chronic GVHD both mild and limited. At day 30 post HSCT, compared to historic control, patients exposed to statin had no difference in B cells(CD19+) or total T cells (CD3+/DR+; CD3+/DR-), but a significant decline in NK cells, including total NK cells and NK cells positive for CD314 (Table 1).
Conclusion: While this is a small sample, and no conclusion can be deduced, it is interesting to note the significant difference in the number of NK cells in patients exposed to statin as compared to historic control.

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Different Natural Killer (NK) Cell Subsets Elicit Unique Target Induced Immune Responses: Implications for Assessment of Posttransplant Functional Recovery of the Relevant NK Cell Subsets and Their Impact On HCT Outcomes

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